CarMD
FOR THE LIFE OF YOUR CAR

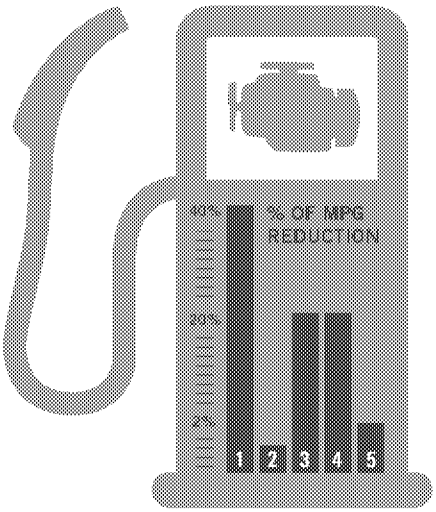
Vehicle Health Index™

...The Data Behind the Diagnostics

APRIL 2013

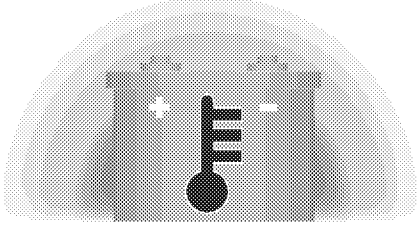
5 MOST COMMON CHECK ENGINE PROBLEMS

AND HOW THEY REDUCE FUEL ECONOMY



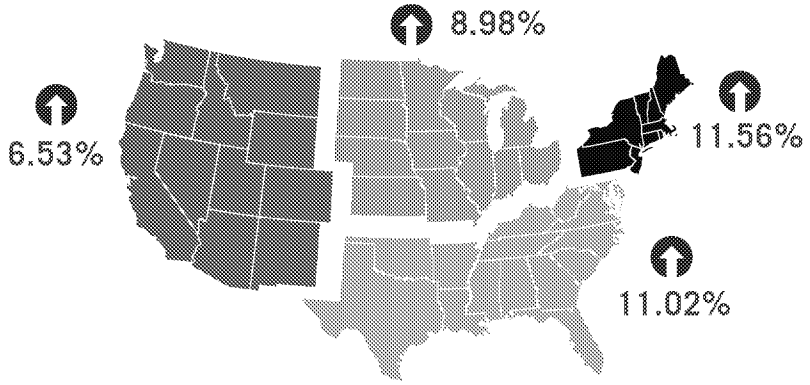
1. O2 Sensor (up to 40%)
2. Gas Cap (0.5%)
3. Catalytic Converter (20%)
4. Ignition Coil (20%)
5. Spark Plug and Wires (2%)

FEELING THE HEAT



RISING REPAIR COSTS BY REGION

2011 - 2012



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INTRODUCTION

CarMD.com Corporation is pleased to present its 2013 CarMD® Vehicle Health Index™ revealing the most common check engine light-related problems, repairs and associated repair costs. Now in its third year, the CarMD Vehicle Health Index provides consumers, media and the automotive industry with data to compare year-over-year car maintenance and repair trends, shedding light on economic and environmental trends impacting the type and cost of repairs.

SUMMARY

After a six-year trend in annual repair cost drops, 2012 saw a 10% increase in car repair costs to $367.84 due largely to an uptick in labor costs. We attribute this to several factors, including an improving economy and a return to pre-recession labor rates. The average age of vehicles has also reached an all-time high, which has caused a slight increase in percentage of more expensive repairs.

Repair costs were up across each U.S. region as well, but the region hit hardest in 2012 was the Northeast with an 11.5% increase in car repair costs.

Further, battery and charging system replacements appeared in the top 10 most common repairs for the first time with a six-point rise from no.16 to no.10. This can be attributed to several factors, including more late-model vehicles that use on-board technology to track insufficient charging voltage such as low battery, as well as a continued increase in average temperatures. As the U.S. logged its hottest year on record last year, car owners need to be aware of heat-related problems and failures, and adjust their maintenance and repair trends accordingly.

Costs also increased with all but one of the top 10 most common repairs, including a 20% increase in the cost to repair the oxygen sensor – the no.1 most common repair. However, hybrid repair costs – historically among the highest in the index dropped significantly as more hybrids on the road brought the costs down. One of the most common repairs, tightening a loose gas cap, continues to fall as consumers become savvier in taking care of the simple diagnosis. Repair shops offering gas cap diagnosis as a free vs. paid service is also a growing trend.

Repairs related to significant recalls have emerged among common repairs, as have fixes related to newer systems such as antilock brakes, and residual effects of parts failing due to the effects of higher percentage ethanol-blend fuels.

New auto sales were up 13% in 2012 – the strongest since 2007 – and R.L. Polk projects 2013 will see at least a 6% increase in new car sales. As more new, better-designed vehicles are added to the population and consumers embrace early warning technology, CarMD projects a continued drop in the number of catastrophic repairs and an increase in new systems among the most common repairs.

"Through our third annual Vehicle Health Index, CarMD is able to provide valuable car repair trend data to consumers and the industry, particularly relating to an aging vehicle population with an influx of vehicles outside the warranty 'honeymoon' period."

~ Ieon C. Chen, CEO, CarMD

"This year's data uncovers some interesting findings. On one hand we're seeing an increase in car repair costs that can be attributed to several factors, including a market correction and a higher percentage of expensive, catastrophic repairs. On a more positive note, it's clear that consumers are becoming much savvier when it comes to addressing minor car repairs, and that manufacturers continue to make vehicles better as indicated by a slight decrease in repair incidents."

2013 CarMD® VEHICLE HEALTH INDEX™

HIGHLIGHTS

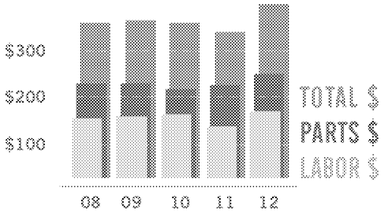
FIRST, THE BAD NEWS...

In a return to pre-recession rates, car repair costs across the U.S. were up 10% in 2012 after a nearly six-year trend of decreased repair costs.

- Average **labor costs were up 17%** and parts costs were up 6% over the previous year.
- All but one of the 10 most common repairs saw an increase in repair costs.

CAR REPAIR COSTS ↑ 10%

RETURN TO PRE-RECESSION RATES

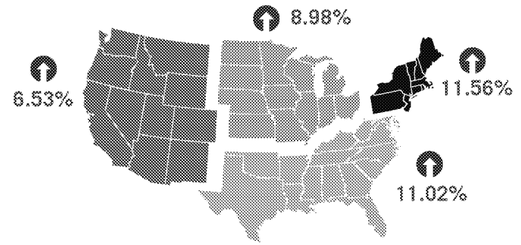


The gap between the most and least affordable regions for auto repairs has narrowed, but repair costs rose across each region with the Northeast experiencing the greatest increase.

- In 2012, **drivers in the Western U.S. paid the most** for car repairs at an average cost of $360.89, which was 14% more than **drivers in the Midwest, who paid the least** ($309.75). However, in 2011 drivers in the West paid 17% more than drivers in the Midwest.
- **Northeast** drivers were **hit hardest** with an **11.56% increase** in car repair costs, adding insult to injury after Hurricane Sandy.

RISING REPAIR COSTS BY REGION

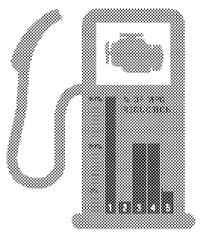
2011 - 2012



Each of the five most common check engine problems will **negatively affect your car's fuel economy** if you ignore it and keep driving.

5 MOST COMMON CHECK ENGINE PROBLEMS

AND HOW THEY REDUCE FUEL ECONOMY



1. O2 Sensor (up to 40%)
2. Gas Cap (0.5%)
3. Catalytic Converter (20%)
4. Ignition Coil (20%)
5. Spark Plug and Wires (2%)

WHAT ARE THE MOST COMMON REPAIRS FOR YOUR CAR?

Available at www.carmd.com/ScoreCard is a **FREE** online CarMD® Vehicle Health ScoreCard™ tool. Input the year, make, model and mileage of any vehicle, and you'll see how that car compares to other vehicles on the road as well as the most common repairs/repair costs by reported mileage, which is useful to budget cost of ownership or a used car purchase.

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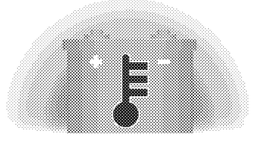
HIGHLIGHTS

Heat affects car parts. According to the National Oceanic and Atmospheric Administration, **2012 marked the hottest year on record for the lower 48 states.** Heat and dry climate can cause premature aging of many parts, including a car's battery, transmission and more.

- Battery and transmission-related repairs are among the parts that saw an increase in repair frequency, which can be partially **attributed to their sensitivity to heat.**

FEELING THE HEAT

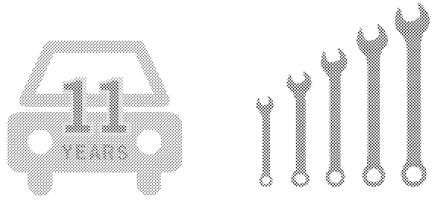


2012 was the hottest year on record for the lower 48 states. Drivers need to be aware of car parts' susceptibility to heat.

As the average vehicle **age has reached an all-time high of 11 years** and rising, expensive and **catastrophic repairs are rising with it.**

- A year ago, the 15 most expensive repairs accounted for 0.83% of repairs seen by CarMD's network of automotive technicians. Last year that number rose to 1.03% of repairs. Thankfully this number is still small when compared with the 15 least expensive repairs, which account for 7.28% of repair shop visits.

AVERAGE VEHICLE AGE = CATASTROPHIC REPAIRS



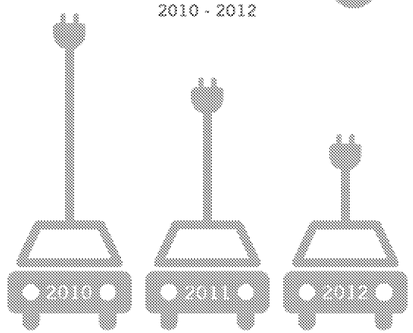
NOW, SOME GOOD NEWS...

Hybrid repairs continue to drop with increased volume of hybrids on the road, as well as more parts available and people trained to service them.

- **Hybrids** account for four of the top 10 most expensive repairs, but **no longer hold the no.1 spot.**
  - A year ago, the most expensive repair was "replace hybrid inverter assembly" ($4,098)... a repair which has cost as much as $7,391 in previous years.
  - This year, the no.1 **most expensive repair is "Replace Transmission Assembly and Reprogram Electronic Control Module" ($5,474).** This repair, which applies to select vehicles, including 2001 Honda Civics and some 2001 Volvos, is indicative of the fact that cars are being made to outlast parts such as their transmission.

HYBRID REPAIR COSTS

2010 - 2012



~$7,300 $4,098 $3,927

Cost to replace inverter assembly fails for second consecutive year.

2013 CarMD® VEHICLE HEALTH INDEX™

HIGHLIGHTS

Manufacturers are making cars to last longer, which can result in fewer trips to the dealership/repair shop but also more expensive repairs down the line.

- This year the number of **check engine-related repairs dropped 1.3%** overall with 161,350 repairs reported in 2012 versus 163,532 fixes made in 2011.

CHECK ENGINE RELATED REPAIRS

2012

Previously the no.1 reason for check engine problems, the **gas cap is decreasing as a nuisance for car owners** each year.

- In 2012, a damaged or loose gas cap accounted for 7.21% of visits to the shop, down from 8.26% in 2011 and 9.28% in 2010. Improvements in gas cap (and capless) technology as well as more **savvy consumers becoming more comfortable diagnosing** and addressing smaller repairs on their own are contributing to its decline.
- Other common repairs that can be diagnosed and handled by a light do-it-yourselfer include: oxygen sensors, spark plugs and air filters.

GAS CAP RELATED REPAIRS

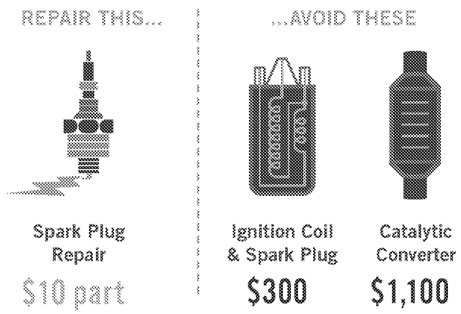
2010 - 2012

9% > 8% > 7%

Paying attention to small problems and recommended maintenance schedules extend the life of your car and minimize check engine-related failures and repairs.

- The O2 sensor's life can be extended by using factory-recommended fuel types, and getting regular oil and spark plug changes.
- April Car Care Awareness Month (or any time of year) is a good time to address problems. **Ignore a spark plug and a $10 part can turn into a $300 ignition coil repair**. Ignore that and you **risk damaging your car's catalytic converter at an average cost of $1,100**, not to mention reduced MPG.

TIMELY REPAIRS SAVE CASH



THE TOP TEN
CHECK ENGINE LIGHT REPAIRS

1 **The most common car repair (8.31%) in 2012 was "replace oxygen sensor" for the third consecutive year.** Extremely important to both your car's engine performance and to the environment, the O2 sensor measures the amount of unburned oxygen in the exhaust and tells a car's computer when there is either too much, or not enough fuel as compared with oxygen for ideal operation. O2 sensors fail prematurely due to a variety of causes, including the effects of newer fuel blends with higher ethanol content, lack of maintenance such as neglecting oil changes or engine contamination from burning oil or internal coolant leaks. A faulty O2 sensor costs less than $300 to fix but can lead to as much as a 40% reduction in gas mileage if ignored. Many drivers ignore the O2 sensor because their car often seems like it's driving just fine, but in reality it's reducing your fuel economy and slowly doing more damage to your car.

- The average cost to replace O2 sensor increased nearly 20% from $246.39 in 2011 to $293.88 in 2012, comprised of $132.62 for labor and $161.26 parts.

2 **"Tighten or replace fuel cap" remains the second most common repair, but continues to drop in percentage of repairs.** In 2010 it accounted for 9.28% of repairs. In 2011 the gas cap accounted for 8.26% of repairs. And in 2012, it dropped to 7.21%. Missing or damaged gas caps can cost time and money, triggering the check engine light and a repair shop visit. Faulty gas caps allow millions of gallons of fuel to evaporate every year, and gas evaporates more quickly when it's warm. Simply tightening the cap for free or replacing it for a couple dollars is the repair, but if left unchecked can result in a 0.5% decrease in gas mileage and harm the environment.

- The average cost to address a gas cap problem has dropped from $1.00 in 2011 to only 10 cents per repair shop visit in 2012, indicating most dealership and repair shops are offering this diagnosis as a free service.

3 **The third most common repair, "replace catalytic converter(s)," accounted for 6.26% of repairs in 2012.** In most cases, a catalytic converter generally won't fail unless a related part – such as a spark plug – is ignored for too long. Some states, such as California, have more stringent emissions requirements for catalytic converters, which drives up the national average for this part.

- The average cost to replace a catalytic converter rose 7% from $1,028.53 in 2011 to $1,101.44 this past year.

4 **"Replace ignition coil(s) and spark plug(s)" is the fourth most common repair accounting for 5.25% of repairs in 2012.** Ignition coils are important, and help the engine start and keep running. They take the battery's 12-volt current and step it up to ignite the spark plugs. Your car may have only one ignition coil, or as many as it has cylinders. Several conditions can contribute to its failure, including faulty spark plugs, high underhood temperatures and age. A driver should pay attention to possible symptoms surrounding engine coil failure as it will soon affect other vehicle systems, such as the costly catalytic converter, and can leave them stranded by the roadside.

- The cost to repair ignition coils increased nearly 7% from $296.87 in 2011 to $316.58 in 2012, but is often covered under a vehicle's powertrain warranty.

5 **The small but mighty spark plug regains its spot as the fifth most common culprit for 2012 check engine-related repairs (3.53%), but has dropped in overall percentage of repairs since 2011 (3.62%).** Responsible for igniting a car's air/fuel ratio, spark plugs are essential and when they fail they can cause a "misfire," reduce gas mileage by at least 2%, and ultimately result in melting/permanent damage to your catalytic converter(s). If you do it yourself, replacing a spark plug can cost under $10, but can save thousands of dollars down the road.

- The average cost to replace spark plug(s) and spark plug wire(s) jumped nearly 9% from $314.67 in 2011 to $342.55 in 2012.

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6 **The sixth most common repair (3.46%) is replace the Mass Air Flow Sensor (MAF),** which is responsible for metering the air coming into your car's engine and determining how much fuel to inject into the engine. When malfunctioning, it can lower fuel economy by 10% to 25%. It costs approximately $400 to repair, but is vital to saving dollars at the pump.

- Mass air flow sensor replacement costs have jumped roughly 3% from $396.91 to $410.17 over the past year.

7 **At no. 7 in 2012 was "Remove Aftermarket Alarm," at an average cost of $98.00 in labor.** Aftermarket parts should be installed by a qualified technician, as installing the wrong part or plugging it into the wrong place can damage other systems as is common with aftermarket alarms.

- Indicative of the increase in automotive repair labor rates, the average rate to remove aftermarket alarm rose nearly 20% from $82.00 in 2011 to $97.90 last year.

8 **No. 8, accounting for 2.35% of repairs in 2012, is "Inspect for Faulty Vacuum Hose(s) at EVAP System and Repair as Needed."** Your fuel system is vented into a charcoal canister to trap vapors from evaporating gas. The EVAP system will malfunction if its hoses and fittings leak.

- The average cost to repair a vacuum hose problem jumped to $107.32 in 2012 from $95.83 the previous year – a 12% increase.

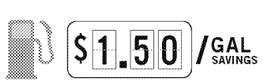
9 **The ninth most common check engine-related repair is "Replace Exhaust Gas Recirculation (EGR) Valve and Clean all EGR Ports."** EGR helps your car run more efficiently and helps control emissions. The EGR valve re-circulates a portion of the exhaust back through the combustion process thereby lowering the combustion temperature and the formation of nitrous oxide emissions. A faulty EGR valve or blocked EGR passage can cause rough idling, engine hesitation, misfire and poor fuel economy.

- The average cost to replace an EGR valve in 2012 was $325.95 – up slightly from $321.11 the year prior.

10 **New to the top 10 is "Inspect Battery and Charging System and Repair/Replace as Necessary," which jumped six spots from no.16 last year.**

- Batteries have always been among the parts most frequently replaced on cars, but now computers on today's high tech cars are able to monitor voltage on complex charging systems and trigger the check engine light when voltage isn't correct, which contributes to the increase in battery and charging system repair incidents reported to CarMD.
- Heat and dry climate can also result in premature aging of parts such as car batteries, resulting in the need for more frequent replacement than the typical recommended 3-year time period. According to the National Oceanic and Atmospheric Administration, 2012 marked the hottest year on record for the lower 48 states.
- The average cost to address a battery and charging system problem rose a whopping 15% from $87.74 in 2011 to $100.63 in 2012.

Average cost to diagnose gas cap related problem, which is down 90% from nearly $1.00 a year ago.



Up to 40% benefit in fuel economy by fixing bad O2 sensor: equivalent to saving $1.50/gallon at the pump.

THE TOP TEN
CHECK ENGINE LIGHT REPAIRS

1 Replace O2 Sensor
$293.88 AVG repair
8.31% of CEL repairs

2 Inspect Gas Cap
10¢ AVG repair
7.21% of CEL repairs

3 Replace Catalytic Converter
$1,101.44 AVG repair
6.26% of CEL repairs

4 Replace Ignition Coil and Spark Plug
$316.58 AVG repair
5.25% of CEL repairs

5 Replace Spark Plug(s) and Wire(s)
$342.55 AVG repair
3.53% of CEL repairs

6 Replace Mass Airflow Sensor
$410.17 AVG repair
3.46% of CEL repairs

7 Remove Aftermarket Alarm System
$97.90 AVG repair
2.46% of CEL repairs

8 Replace Faulty Vacuum Hose
$107.32 AVG repair
2.35% of CEL repairs

9 Replace EGR Valve
$325.95 AVG repair
2.32% of CEL repairs

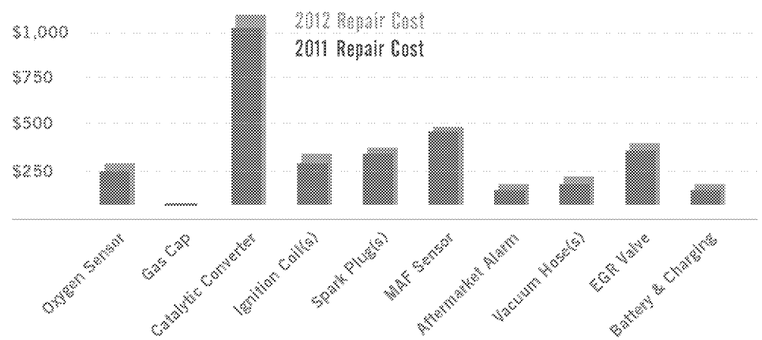
10 Inspect/Replace Battery/Charging System
$100.63 AVG repair
2.22% of CEL repairs

2013 CarMD® VEHICLE HEALTH INDEX™

THE TOP TEN
CHECK ENGINE LIGHT REPAIRS

Increase / Decrease In Cost To Repair 10 Most Common Check Engine-Related Car Repairs 2011 vs. 2012

Rank	Vehicle Repair	2011 Total Repair Cost (Parts & Labor)	2012 Total Repair Cost (Parts & Labor)	% Change in Repair Cost Over Prior Year
1	Replace Oxygen Sensor(s) (O2S)	$246.39	$293.88	19.2% ↑
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.97	$0.10	89.6% ↓
3	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,028.58	$1,101.44	7.0% ↑
4	Replace Ignition Coil(s) and Spark Plug(s) if needed	$296.87	$316.58	6.6% ↑
5	Replace Spark Plug Wires and Spark Plugs	$314.67	$342.55	8.8% ↑
6	Replace Mass Air Flow (MAF) Sensor	$396.91	$410.17	3.3% ↑
7	Remove Aftermarket Alarm System	$82.00	$97.90	19.1% ↑
8	Inspect for Faulty Vacuum Hose(s) and Repair as Necessary	$95.83	$107.32	11.9% ↑
9	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$321.11	$325.95	1.5% ↑
10	Inspect Battery and Charging System and Repair/Replace as Necessary	$87.74	$100.63	14.6% ↑



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WHERE DOES CarMD's INDEX DATA ORIGINATE?

Beginning in 1996, the U.S. government mandated on-board diagnostics (OBD2) for all foreign and domestic cars, light trucks, minivans and SUVs sold in the United States. This universal technology detects malfunctions, sets a diagnostic trouble code (DTC) and turns on the check engine light if a problem (or potential problem) is detected. The system provides vital health and safety information for approximately 80% of a vehicle's systems, and is currently installed on nearly 85% of vehicles nationwide, including newer hybrids and diesels. It can be accessed by a range of diagnostic tools used throughout the industry.

Since 1996, CarMD has been building the most comprehensive database of diagnostic trouble codes; expert fixes and repair costs. These repairs come directly from the cars themselves and the professionals who service them. As a result, CarMD is able to provide unbiased data on repair costs and trends. This 2013 Index statistically analyzes more than 161,000 repairs that apply to more than 200 million vehicles on the road in the U.S. CarMD's network of thousands of Automotive Service Excellence (ASE)-certified, factory-trained technicians recommend, confirm and upload roughly 500 new repair scenarios daily to the CarMD database, which are then validated by the company's Master Tech committee of top industry professionals. This data is used to compile the CarMD® Vehicle Health Index™.

WHAT'S NEW?

Several new repairs appeared in the top 25 most common repairs for 2012, including "Replace ABS Modulator Assembly" (no. 21), "Reprogram Engine Control Module" (no. 24) and "Replace Throttle Body Assembly" (no. 25).

- "Replace ABS Modulator Assembly" was not even on the list of most common repairs in 2011, but is now in the no. 21 spot. When not working or assembled properly, the ABS modulator can cause a vehicle's anti-lock brakes to be ineffective or less effective than they should be. While an ABS modulator assembly problem can occur on any vehicle that has an ABS system, it's the third most common repair on Honda vehicles, due partially to a recall that affected more than 400,000 Odyssey and Element vehicles. While ABS has been available for decades, only recently have vehicle manufacturers made it standard on a wider range of vehicles and linked it to the OBD2 system, which explains the increase in ABS-related repairs. For instance, "Replace ABS Control Module" now ranks no.13 among most common repairs, up 7 spots from no. 20 in 2011.
- Now the no. 24 most common repair, "Reprogram Electronic Control Module (ECM)" is often needed due to updated software calibration to help the engine and transmission controls work more efficiently. Some common reasons include improving transmission shift quality, engine idle and performance or fuel economy. In the past when new software was required, the entire Engine Control Unit (ECU) or ECM would need to be replaced. Thanks to advances in technology such as high-speed Internet and powerful PC-based scan tools, dealers are now able to quickly reprogram the ECM or ECU, versus replacing it, saving customers time and money.
- Throttle bodies (no. 25) are responsible for regulating air intake into the engine. They are vulnerable to heat and contamination due to carbon buildup, they take a lot of abuse, and require regular maintenance and cleaning. Most, if not all of the vehicle manufacturers are putting electronic controlled throttle bodies on newer vehicles, which becomes another electronic part that is susceptible to failure.

2013 CarMD® VEHICLE HEALTH INDEX™

MOST/LEAST EXPENSIVE CAR REPAIRS

The CarMD® Vehicle Health Index™ illustrates that while **hybrid repairs can still be very pricey, the costs continue to come down with increased volume of hybrids on the road, as well as parts and people trained to service them.** The most expensive vehicle repair in 2012 is no longer a hybrid-specific repair, but rather a transmission-related repair.

- In 2012, "replace hybrid inverter assembly" dropped to the third most expensive repair at roughly $3,900. In 2011 that repair was the no.1 most expensive repair at $4,000, and historically that same hybrid inverter assembly repair would have cost as much as $7,000.
- CarMD projects the cost of hybrid repairs will continue to come down as hybrid vehicle registration grows. According to Ward's Automotive, hybrid sales were up 64% from 251,507 in 2011 to 427,605 in 2012; however, true hybrids account for less than 3% of the total U.S. registered vehicle market.

The **most expensive repair** in the CarMD database in 2012 was "Replace Transmission Assembly and Reprogram Electronic Control Module" ($5,474). This repair, which applies to select vehicles, including 2001 Honda Civics and some 2001 Volvos, is indicative of the fact that cars are being made to outlast parts such as their transmission. When 2001 vehicles were being designed, it was uncommon for a car to last an average of 10.8 years and beyond.

- Remaining the second most expensive repair is "Replace Transmission and Torque Converter." However, the average cost for this repair jumped from $3,980 in 2011 to $4,467 in 2012.
- The good news is that most expensive repairs remain extremely rare in terms of percentage of occurrence. The top 15 most expensive repairs combined only account for about 1% of all repairs seen by CarMD's network of thousands of certified technicians last year.
- For the second year in a row, the **least expensive repair** was "inspect engine oil for correct level and viscosity," which is a fancy way of saying "check the oil." The cost? Free.
- The second least expensive repair is "inspect for loose fuel cap and tighten or replace as necessary" at an average repair cost of only 10 cents, down 90% from an average repair cost of $1.00 over the past few years. More savvy and vigilant drivers are watching for gas cap related repairs, and car repair shops are addressing this minor repair for free to build rapport with their customers.

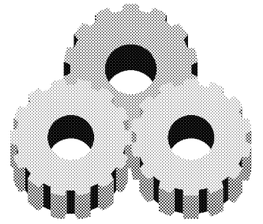
INSPECT ENGINE OIL

LEAST EXPENSIVE REPAIR OF 2012

FREE

REPLACE TRANSMISSION ASSEMBLY

MOST EXPENSIVE REPAIR OF 2012



$5,474

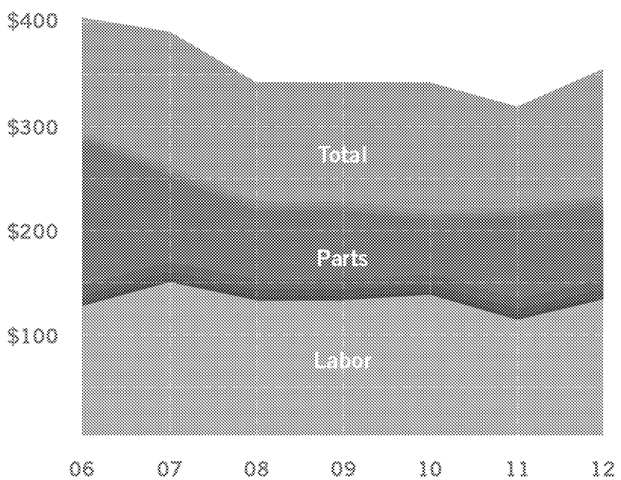
REPAIR COSTS/NATIONAL TRENDS

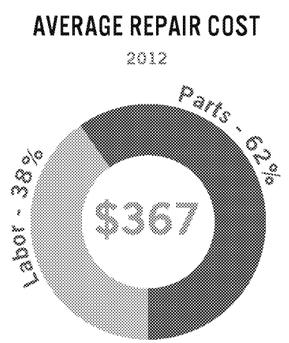
Car repair costs are on the rise after a 2-year dip in overall check engine related repair cost, and a six-year downward trend overall.

- In 2012, the average repair including parts and labor jumped 10% to $367.84.
  - Average repair costs are now more in line with 2009 averages but still 13% less than their high in 2006 ($422.36).

U.S. Average Car Repair Cost Trends (7-Year History for 2006 – 2012)

Year	Labor	Parts	Total Avg. Repair Cost
2012	$138.96	$228.88	$367.84
2011	$118.61	$215.32	$333.93
2010	$143.61	$212.44	$356.04
2009	$138.37	$221.13	$359.50
2008	$135.21	$220.98	$356.19
2007	$152.92	$256.98	$409.91
2006	$131.06	$291.30	$422.36





2013 CarMD® VEHICLE HEALTH INDEX™

REPAIR COSTS/REGIONAL TRENDS

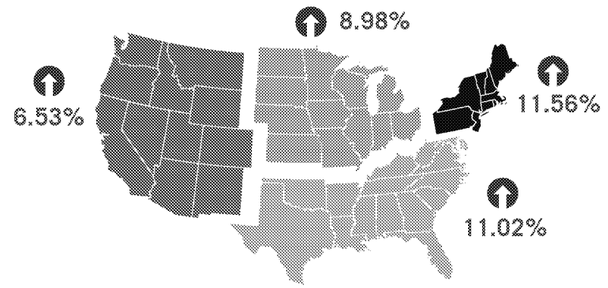
In 2012, the national average for automotive repair labor costs increased 17% from the previous year, which is the same percentage decrease seen in labor rates in 2011. Parts costs jumped 6% from the previous year.

- Further proof of a rebounding economy, the increase in labor rates show independent repair shops and dealerships that survived the recession are now comfortable enough to increase rates and start recouping money due to labor rate decreases over the past few years.
- Additionally, parts costs have jumped due to increased material costs and because of a slight increase in the percentage of more costly repairs such as transmission replacements.

Car repair costs were up across all regions of the U.S., but the Northeast got hit the hardest with an 11.56% increase in repair costs, as consumers are still reeling from the effects of Hurricane Sandy.

Vehicle owners in the West paid the most for check engine-related car repair – 14% more than drivers in the Midwest, who paid the least, but a gap is closing between the regions with the highest and lowest average car repair costs as the previous Vehicle Health Index found that drivers in the West paid 17% more than those in the Midwest did for repairs. The average cost of vehicle repairs in 2012 are as follows:

- Nationwide – $367.84 per repair.
- West – $384.46 per repair.
- Midwest – $336.75 per repair.
- Northeast – $369.81 per repair.
- South – $372.44 per repair.



U.S. National Average Repair Costs – 2011 vs. 2012

Region	2011 Total Avg. Repair Cost	2012 Total Avg. Repair Cost	% Increase From Previous Year
Nationwide	$333.93	$367.84	10.15%
West	$360.89	$384.46	6.53%
South	$335.48	$372.44	11.02%
Northeast	$331.50	$369.81	11.56%
Midwest	$309.00	$336.75	8.98%

DETAILED INDEX DATA

Nationwide 2012: Top 25 Most Common Check Engine Vehicle Repairs

Rank	Vehicle Repair	Total Average Repair Cost (Parts&Labor)	% 2012 Repairs	Change In Rank Since 2011
1	Replace Oxygen Sensor(s) (O2S)	$293.88	8.31%	1 - no change
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.10	7.21%	2 - no change
3	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,101.44	6.26%	3 - no change
4	Replace Ignition Coil(s) and Spark Plug(s) if needed	$316.58	5.25%	4 - no change
5	Replace Spark Plug Wires and Spark Plugs	$342.55	3.53%	6 ↑
6	Replace Mass Air Flow (MAF) Sensor	$410.17	3.46%	5 ↓
7	Remove Aftermarket Alarm System	$97.90	2.46%	10 ↑
8	Inspect for Faulty Vacuum Hose(s) and Repair as Necessary	$107.32	2.35%	9 ↑
9	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$325.95	2.32%	8 ↓
10	Inspect Battery and Charging System and Repair/Replace as Necessary	$100.63	2.22%	16 ↑
11	Replace Positive Crankcase Ventilation (PCV) Valve and Hose	$117.81	2.17%	7 ↓
12	Inspect for Faulty Wiring and Repair as Necessary	$136.92	2.15%	19 ↑
13	Replace Wheel Speed Sensor(s)	$218.91	2.14%	17 ↑
14	Replace ABS Control Module	$840.11	1.83%	20 ↑
15	Replace Camshaft Position Sensor (CMP)	$214.71	1.61%	13 ↓
16	Replace Intake Manifold Gasket(s)	$381.33	1.61%	12 ↓
17	Replace Fuel Injector(s)	$525.62	1.49%	14 ↓
18	Replace Thermostat	$180.86	1.44%	15 ↓
19	Replace Engine Coolant Temperature Sensor (ECT)	$169.31	1.43%	11 ↓
20	Replace Evaporative Emissions (EVAP) Purge Solenoid	$166.70	1.40%	18 ↓
21	Replace ABS Modulator Assembly	$1,206.93	0.858%	New to Top 25
22	Replace Air/Fuel Ratio Sensor (AFR)	$333.69	0.819%	24 ↑
23	Replace Crankshaft Position Sensor (CKP)	$220.62	0.796%	25 ↑
24	Reprogram Engine Control Module (ECM)	$106.48	0.714%	New to Top 25
25	Replace Throttle Body Assembly	$569.21	0.710%	New to Top 25

(Top 25 most common vehicle repairs are based on 161,350 repairs made in calendar year 2012 on 1996-2012 model year vehicles. This data applies to roughly 35% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

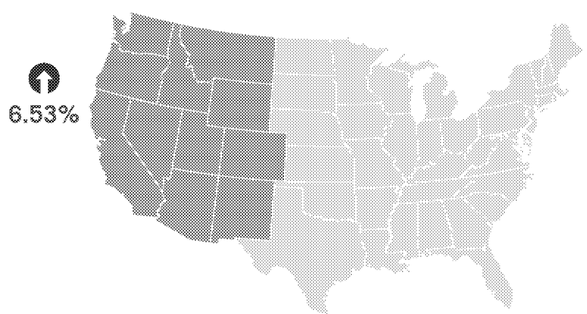
2013 CarMD® VEHICLE HEALTH INDEX™

DETAILED INDEX DATA

Western U.S. 2012: Top 10 Most Common Check Engine Vehicle Repairs

Rank	Vehicle Repair	Total Average Repair Cost (Parts & Labor)	% 2012 Western U.S. Repairs	Change In Western Rank Since 2011
1	Replace Oxygen Sensor(s) (O2S)	$260.46	7.81%	1 – no change
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.13	6.56%	2 – no change
3	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,101.02	5.98%	3- no change
4	Replace Ignition Coil(s) and Spark Plug(s) if needed	$324.78	4.89%	4 – no change
5	Replace Mass Air Flow (MAF) Sensor	$423.10	4.11%	5 – no change
6	Replace Spark Plug Wires and Spark Plugs	$352.83	3.61%	6 – no change
7	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$329.34	2.30%	8 - ↑
8	Remove Aftermarket Alarm System	$99.84	2.28%	New to West top 10
9	Inspect Battery and Charging System and Repair/Replace as Necessary	$101.89	2.20%	New to West top 10
10	Replace ABS Control Module	$859.77	1.90%	New to West top 10

(Top 10 most common vehicle repairs in the Western U.S. are based on 36,256 repairs in 2012 in AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA and WY. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)



$417.79

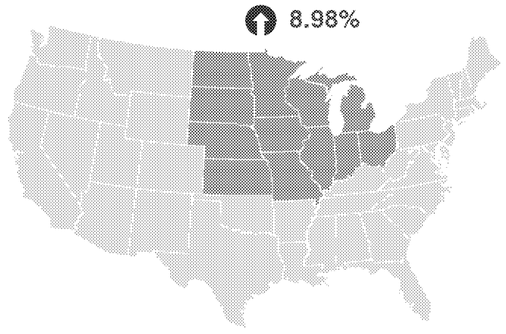
Average cost to repair the top 10 most common check engine vehicle problems in the Western United States.

DETAILED INDEX DATA

Midwestern U.S. 2012: Top 10 Most Common Check Engine Vehicle Repairs

Rank	Vehicle Repair	Total Average Repair Cost (Parts & Labor)	% 2012 Midwestern U.S. Repairs	Change In Midwestern Rank Since 2011
1	Replace Oxygen Sensor(s) (O2S)	$234.77	8.45%	1 – no change
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.02	8.09%	2 – no change
3	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,078.15	5.34%	3 – no change
4	Replace Ignition Coil(s) and Spark Plug(s) if needed	$315.49	4.44%	5 - ↑
5	Replace Spark Plug Wires and Spark Plugs	$339.34	3.82%	4 - ↓
6	Replace Mass Air Flow (MAF) Sensor	$386.81	3.38%	6 – no change
7	Remove Aftermarket Alarm System	$96.75	3.20%	7 – no change
8	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$319.27	2.62%	8 – no change
9	Replace Wheel Speed Sensor(s)	$243.00	2.22%	9 – no change
10	Replace Evaporative Emissions (EVAP) Purge Solenoid	$159.85	2.02%	New to Mid-west top 10

(Top 10 most common vehicle repairs in the Midwestern U.S. are based on 28,167 repairs in 2012 in IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD and WI. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)



$317.35

Average cost to repair the top 10 most common check engine vehicle problems in the Midwestern United States.

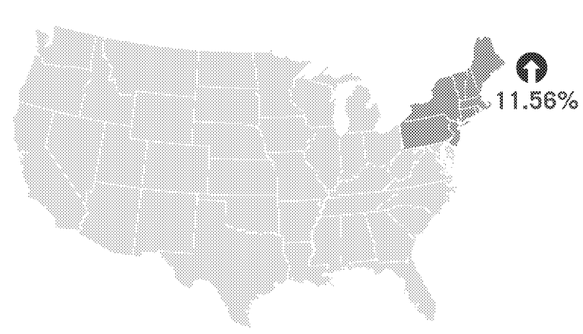
2013 CarMD® VEHICLE HEALTH INDEX™

DETAILED INDEX DATA

Northeasten U.S. 2012: Top 10 Most Common Check Engine Vehicle Repairs

Rank	Vehicle Repair	Total Average Repair Cost (Parts & Labor)	% 2012 NE U.S. Repairs	Change In NE Rank Since 2011
1	Replace Oxygen Sensor(s) (O2S)	$255.87	8.96%	1 – no change
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.14	8.89%	2 – no change
3	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,117.40	6.88%	3 – no change
4	Replace Ignition Coil(s) and Spark Plug(s) if needed	$321.28	4.94%	4 – no change
5	Replace Spark Plug Wires and Spark Plugs	$330.36	3.46%	5 – no change
6	Replace Mass Air Flow (MAF) Sensor	$402.76	2.81%	6 – no change
7	Replace Wheel Speed Sensor(s)	$220.07	2.03%	8 - ↑
8	Inspect Battery and Charging System and Repair/ Replace as Necessary	$100.11	2.02%	New to NE top 10
9	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$325.54	2.02%	7 - ↓
10	Remove Aftermarket Alarm System	$97.09	1.98%	10 – no change

(Top 10 most common vehicle repairs in the Northeastern U.S. are based on 31,665 repairs in 2011 in CT, MA, ME, NH, NJ, NY, PA, RI and VT. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)



$317.07

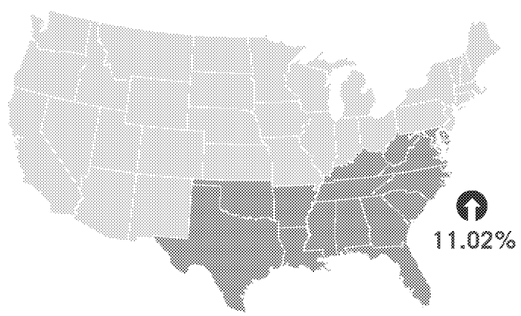
Average cost to repair the top 10 most common check engine vehicle problems in the Northeastern United States.

DETAILED INDEX DATA

Southern U.S. 2012: Top 10 Most Common Check Engine Vehicle Repairs

Rank	Vehicle Repair	Total Average Repair Cost (Parts & Labor)	% 2012 NE U.S. Repairs	Change in Southern Rank Since 2011
1	Replace Oxygen Sensor(s) (O2S)	$253.48	7.89%	1 – no change
2	Replace Catalytic Converter(s) with new OE Catalytic Converter(s)	$1,099.26	6.66%	3 - ↑
3	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.08	6.48%	2 - ↓
4	Replace Mass Air Flow (MAF) Sensor	$412.48	3.41%	6 - ↑
5	Replace Spark Plug Wires and Spark Plugs	$344.83	3.39%	5 – no change
6	Replace Ignition Coil(s) and Spark Plug(s) if needed	$325.93	5.21%	4 - ↓
7	Inspect Battery and Charging System and Repair/ Replace as Necessary	$100.68	2.55%	10 - ↑
8	Remove Aftermarket Alarm System	$97.82	2.51%	9 - ↑
9	Replace Exhaust Gas Recirculation (EGR) Valve and Clean All EGR ports	$328.31	2.26%	8 - ↓
10	Replace ABS Control Module	$831.63	1.81%	New to South top 10

(Top 10 most common vehicle repairs in the Southern U.S. are based on 61,445 repairs in 2012 in AK, AL, DC, DE, FLGA, KY, LA, MD, MS, NC, OK, TN, VA, SC, TX and WV. This data applies to roughly 85% of cars, light trucks, minivans and SUVs on the road in the U.S. – foreign and domestic. Source: CarMD.com Corp.)



$379.07

Average cost to repair the top 10 most common check engine vehicle problems in the Southern United States.

2013 CarMD® VEHICLE HEALTH INDEX™

DETAILED INDEX DATA

Nationwide 2012: The 15 Most Expensive Check Engine Vehicle Repairs

Rank	Vehicle Repair	Type of Vehicle(s)	Total Repair Cost (Parts&Labor)
1	Replace Transmission Assembly and Reprogram Electronic Control Module (ECM)	2001-2004 Honda Civic, 2003-2011 Range Rover, 2007-2010 Mini Cooper, 2001-2006 Volvo vehicles	>$5,400
2	Replace Transmission and Torque Converter	Various makes and models	>$ 4,400
3	Replace Hybrid Inverter Assembly w/Converter	2001-2003 Toyota Prius vehicles	~$ 3,900
4	Replace Transmission Assembly	Various makes and models	>$3,480
5	Replace Integrated Motor Assist (IMA) Battery	2003-2007 Honda Civic Hybrid, 2005-2006 Accord Hybrid, 2007-2011 Nissan Altima Hybrid vehicles	>$3,150
6	Replace Hybrid Battery	2003-2007 Honda Civic, 2000-2006 Insight, 2006 Accord Hybrid, 2001-2009 Toyota Prius 2006-2010 Camry vehicles	>$3,100
7	Replace Hybrid Battery and Reprogram Engine Control Module (ECM)	2007-2009 Saturn Vue, 2007-2009 Honda Civic, Accord, CR-Z and Insight vehicles	>$3,000
8	Replace Fuel Injection Pump	Various makes and models	>$2,600
9	Replace Supercharger	1999-2000 Mercedes C-Class and SLK-Class vehicles	>$2,400
10	Replace Balance Shaft Gear	2006-2010 Mercedes R-Class and 2006-2008 M-Class vehicles	>$2,300
11	Replace Cylinder Head Assembly	Various makes and models	>$2,200
12	Replace Diesel Particulate Filter (DPF) , Clean Exhaust Gas Recirculation (EGR) Ports and Reprogram Engine Control Module (ECM)	2007-2009 Dodge Ram trucks	>$2,100
13	Replace Cylinder Head Assembly & Spark Plug(s)	Various Ford vehicles	~$2,050
14	Replace Transmission Speed Sensor and Reprogram Transmission Control Module (TCM)	2000-2002 Hyundai Accent, 1996-2001 Mazda Millenia, 2007-2008 Nissan Sentra Vehicles	>$2,000
15	Clean all Air Injection (AIR) Ports	Various BMW and Mercedes vehicles	>$2,000

(Top 15 most expensive repairs are based on 161,350 verified repairs made and input into the CarMD database by the company's team of factory trained repair professionals in 2012. This data is for model year 1996 to 2012 OBDII cars, light trucks, minivans and SUVs in the U.S. – foreign and domestic. Although these are the most expensive repairs, very few are common. Source: CarMD.com Corp.)

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DETAILED INDEX DATA

Nationwide 2012: The 15 Least Expensive Check Engine-Related Vehicle Repairs

Rank	Vehicle Repair	Total Cost (Parts & Labor)
1	Inspect Engine Oil for Correct Level and Viscosity	$0.00
2	Inspect for Loose Fuel Cap and Tighten or Replace as Necessary	$0.10
3	Replace Fuel Tank Gas Cap	$22.02
4	Disable Air Injection (AIR) System and Reprogram Powertrain Control Module (PCM)	$89.78
5	Inspect for Faulty Hoses at Wastegate By-Pass Valve and Repair as Necessary	$89.78
6	Inspect Tire Size and Replace as Necessary	$89.78
7	Replace Ambient Light Sensor	$89.78
8	Replace Engine Block Heater Cord	$89.78
9	Replace Engine Control Module (ECM) Wiring Harness	$89.78
10	Replace Tire Pressure Monitor Sensor (TPMS) Module	$89.78
11	Reprogram Instrument Cluster Module	$89.78
12	Inspect for Restricted Exhaust	$92.63
13	Inspect for Faulty Vacuum Hose(s) between Swirl Control Valve and Swirl Control Valve Actuator	$92.81
14	Replace A/C Compressor Control Relay	$93.58
15	Inspect Transmission Fluid and Fill or Replace as Necessary	$94.86

(Top 15 least expensive repairs are based on 161,350 verified repairs made and input into the CarMD database by the company's team of factory trained repair professionals in 2012. This data is for model year 1996 to 2012 OBD2 cars, light trucks, minivans and SUVs in the U.S. – foreign and domestic. Source: CarMD.com Corp.)

2013 CarMD® VEHICLE HEALTH INDEX™

INDEX METHODOLOGY

CarMD has compiled the industry's most comprehensive database of Diagnostic Trouble Codes (DTCs) uploaded by automotive technicians and vehicle owners since 1996. The data for the 2012 CarMD® Vehicle Health Index™ was procured from CarMD's network of thousands of automotive service excellence (ASE)-certified technicians who input and verified failures and repairs into the CarMD diagnostic database from Jan. 1, 2012 to Dec. 31, 2012. This same database is also used to support the consumer automotive tools sold by CarMD but these consumer tools are completely separate from the Index data presented here.

The data was pulled and analyzed between Jan. 14, 2013 and Feb. 8, 2013.

Virtually all makes and models of cars, light trucks, minivans, SUVs and hybrids made since 1996 – foreign and domestic – with on board diagnostic second generation (OBD2) technology are included in the Index. Those makes and models with more registered vehicles on the road may have a larger statistical weighting in the Index findings, as will those vehicles that experience more failures.

In addition to DTC data, CarMD has compiled the most comprehensive database of "fixes" or recommended repairs that correspond to each trouble code scenario. The 2013 Index statistically analyzes 161,350 repairs. Each repair has also been reviewed and validated by CarMD's team of ASE-certified Master Technicians and then output based on a probability algorithm that takes into account the vehicle's year, make, model, mileage, zip code, DTCs and similar vehicle problems to produce a most likely repair. Because the data stems from those U.S. vehicle owners and automotive technicians who elected to use the diagnostic devices and/or upload data into the CarMD database; no estimates of theoretical sampling error can be calculated.

All 50 U.S. states, plus the District of Columbia, are represented in this Index. The states with larger registered vehicle populations and participating ASE-certified technicians may have a larger quantity of logged repairs; however, all have been averaged into the overall Index findings. The data in the Index is applicable to roughly 85 percent of the vehicles on the road, giving a unique perspective on vehicles driven in the U.S. For regional data, CarMD used the U.S. Census Bureau Regions and Division Map to define regions.

Repair costs are based on parts and dealer list plus 10% markup. Labor rates are procured from several sources, including the Undercar Digest National and Regional Hourly Shop Labor Rate reports, as well as the average amount of time required for each repair. Both are updated annually.

CarMD has contracted with an independent consulting company to create and maintain the database for compiling and generating this Index. In most cases, percentages were rounded to the nearest tenth. In the instances of a tie for most common fix, DTC or type of failure, percentages were expanded by rounding to the nearest 100th.

On a daily basis, CarMD's nationwide network of thousands of automotive service excellence (ASE)-certified technicians recommend, confirm and upload repairs and costs by region to the CarMD database, with the database growing in size each year. As a result, subsequent CarMD Vehicle Health Index reports will draw from a larger sampling of diagnostic trouble codes, expert fixes and repair costs.

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